APPARATUS AND METHOD FOR SENDING DATA MESSAGES AT AN OPTIMUM TIME

TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to communication systems that send and receive messages. More specifically, the present invention relates to satellite communication systems that send and receive pre-programmed messages at low cost times and rates.

BACKGROUND OF THE INVENTION

One problem with using a communication system for transmitting data files or messages is the cost of transmission is high at certain times. The user may not know when low traffic times or the most economical times are in his location or in other destination locations. It may be advantageous for an originating party to delay sending a message for economical reasons or convenience. It may be advantageous for a destination party to delay receiving a message for economical reasons or convenience.

Another problem with using a communication system for transmitting and receiving data files or messages is the speed of transmission. Typically, bandwidth is fixed and limited and large data messages may take a long time to send. Furthermore, it may be advantageous for an originating party to send a message in minimal time. It may be advantageous for a destination party to receive a message in minimal time.

Thus what is needed are a method and apparatus to transmit and receive pre-programmed data files or messages. Moreover, what is needed are a method and apparatus for transmitting and receiving data files or messages at lower costs. What is also needed are a method and apparatus for more efficiently transmitting and receiving data files or messages

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a highly simplified diagram of a satellite-based communication system with which the present invention may be practiced.

FIG. **2** illustrates a simplified block diagram of a subscriber unit suitable for use in a preferred embodiment of the present invention.

FIG. **3** illustrates a transmit schedule table suitable for use in a preferred embodiment of the present invention.

FIG. **4** illustrates a personal preference rules table suitable for use in a preferred embodiment of the present invention.

FIG. **5** illustrates a simplified diagram of a procedure for transmitting a pre-programmed message to a receiving party for use in a preferred embodiment of the present invention.

FIG. **6** illustrates a receive schedule table suitable for use in a preferred embodiment of the present invention.

FIG. **7** illustrates a simplified diagram of a procedure for receiving a pre-programmed message transmitted for use in a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The present invention provides, among other things, a system that includes a pre-programmed database with a collection of data files, pager messages, fax messages, or voice messages to be sent at pre-programmed times. The present invention allows a subscriber to send a message(s) at low traffic times (LTT) or the most economical times or both low traffic and most economical times or default times

selected by the communication system. In one embodiment, the messages are sent automatically or autonomously by the communication system. The subscriber creates voice messages, fax messages, pager messages, or data file messages, selects a schedule time to be sent, and receives confirmation of sent messages from a subscriber unit.

An advantage of the present invention is that costs of using the communication system are lowered. This is especially beneficial when using the communication system is expensive. A subscriber lowers the cost by using pre-programmed times to send messages. For example, the subscriber schedules a message to be sent at a particular time of day by using pre-programmed times. In another embodiment, the subscriber allows the communication system to calculate the most economical time to send a message. When cost or time of delivery are unimportant to the subscriber, the message may be sent immediately; however, at that instant, the system capacity could be saturated depending on location and time of usage. Under such conditions, the system stores the message and sends it at the first available opportunity freeing the subscriber from manually resending the message until it is delivered. One advantage is the subscriber does not have to take time to access the phone line, as the communication system does it for him automatically. In another embodiment, the communication system preferably notifies the subscriber when the message was sent.

A "satellite" is defined herein to mean a man-made object or vehicle intended to orbit earth and includes both geostationary and orbiting satellites and/or combinations thereof including low earth orbiting (LEO) satellites. A "constellation" is defined herein to mean an ensemble of satellites arranged in orbits for providing specified coverage (e.g., radio communication, photogrammetry, etc.) of portion(s) or all of earth.

FIG. **1** illustrates a highly simplified diagram of a satellite-based communication system **10** with which the present invention may be practiced. Communication system **10** uses six polar orbits **14**, with each polar orbit **14** holding eleven satellites **12** for a total of sixty-six satellites **12**. However, this is not essential and more or fewer satellites, or more or fewer orbits, may be used. While the present invention is advantageously employed when a large number of satellites are being used, it is also applicable with as few as a single satellite. For clarity, FIG. **1** illustrates only a few of satellites **12**.

For example, each orbit **14** encircles earth at an altitude of around 780 km, although higher or lower orbital altitudes may be usefully employed. Due to the relatively low orbits of exemplary satellites **12**, substantially line-of-sight electromagnetic (e.g., radio, light etc.) transmission from any one satellite or reception of signals by any one satellite involves or covers a relatively small area of earth at any instant. For the example shown, satellites **12** travel with respect to earth at around 25,000 km/hr, allowing satellite **12** to be visible to a terrestrial station for a maximum period of circa nine minutes.

Satellites **12** communicate with terrestrial stations which may include some number of radio communication subscriber units (SUs) **26** and earth terminals (ETs) **24** connected to system control segment (SCS) **28**. Earth terminals **24** may also be connected to gateways (GWs) **22**, which provide access to the public switched telephone network (PSTN) or other communications facilities. Only one each of GWs **22**, SCS **28** and SUs **26** are shown in FIG. **1** for clarity and ease of understanding. Earth terminals **24** may be